

Crooke appears to reckon, as arising out of his scheme, is, that the course of the river between Dight's mills and the outlet, being thereby reduced to about one-third of the length of the present course of the river between those two points, the flood-waters would thus escape the more rapidly. A moment's consideration will show that this is the worst feature of his scheme. At present, the rate of outflow of the waters of the Yarra, in time of floods, is dangerously rapid. If the distance between the two points above referred to were to be reduced to one-third of the present distance, the rate of current would be such as to be beyond control by any ordinary means. I believe there is no important river yet known which has a fall at its outlet at all approaching the fall which the Yarra would have under Dr. Crooke's proposition. I am quite sure that the velocity of the stream would be so great as to destroy any limits which might be assigned to it, if any known works of construction were to be adopted in forming the channel, and I am equally certain that if works, capable of withstanding the vast erosive power of the current were to be adopted, the cost would be enormous.

I have purposely abstained from remarks or suggestions as to the mode of constructing any of the works I have suggested as necessary for preventing future floods in the Yarra. It has been my desire to limit the discussion to general issues. The first point to be decided upon, is the course of the outlet. When that has been settled, it will be early enough to discuss as to how the works shall be built. An argument, on matters of professional detail, at the present moment, could serve no useful purpose, and would draw the attention of members from the more important points involved in this question.

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ART. XXXVI.—*On the Intimate Structure of Cartilage.*

By GEORGE BRITTON HALFORD, M.D., M.R.C.P., Lond.,  
Professor of Anatomy, Physiology, and Pathology,  
University of Melbourne.

[Read 29th August, 1864.]

The preparations beneath the various microscopes from which the diagrams on the walls have been copied, furnish evidence of the existence of two, if not of three, distinct and separable elements of cartilage.

1st. The most constant is the "granular cell" of Messrs. Tomes and De Morgan, the cartilage corpuscle of most authors; the germinal matter of Beale; but, for reasons which will presently be seen, I would call "the cartilage cell."

2nd. An intercellular substance in which the cells are imbedded.

3rd. In some situations capsules which invest the cells, structures between the cells and the intercellular substance.

#### OF THE CARTILAGE CELL.

The cells have been thus obtained. Pieces of ossifying cartilage were soaked in a solution of magenta for two days, afterwards washed for four days in distilled water, and subsequently in glycerine for two or three months, so as to allow of repeated observations. Many of these cells are seen lying perfectly detached from the matrix; they are of the same sizes and shapes as the vacant spaces from which they have escaped. Nearly all possess a distinct nucleus, with granular, and very frequently fatty contents. They are the most persistent and characteristic structure of cartilage, resisting the action of boiling, their contained fat becoming liquified, and refracting the light very brilliantly; they remain undestroyed by concentrated sulphuric acid and caustic potash, which visibly affect, and apparently dissolve, the intercellular substance. Water soon renders them indistinct, but glycerine preserves well their form. Not only are they persistent in structure, but they may be traced from the cartilage into the bone, in which I believe they become, as stated by Messrs. Tomes and De Morgan, the lacunæ or cells of that tissue.\*

The cell may very easily be examined apart from the matrix.

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\* Bealesays, that when soaked in water the germinal matter, and soft imperfectly developed formed material (*i.e.* cartilage cell and nucleus) break down and become liquified, and that then the cartilage appears as a matrix containing numerous vacuoles or spaces. By the process I have employed these cells may be preserved entire and separate from the matrix for months, and very probably for years, retaining their form so as to discountenance the idea of their gradually shading off and blending the forward material or matrix. From a piece of temporary cartilage thus treated they may with the point of a needle be turned out entire, with forms as definite as those of starch granules for instance.

When first treated with the solution of magenta the entire cell is coloured, but after maceration in water the nucleus alone retains the dye. The colour will disappear also from the nucleus upon the application of acetic acid, and will reappear in it upon subsequent washing with distilled water and reapplying the magenta. The latter is rather a delicate operation, but when it succeeds it well repays the trouble—the cell-wall remaining quite uncoloured, the nucleus coloured.

Whenever a cell exists singly I have been unable to detect an outer cell wall, but this is no longer the case when the cell divides and multiplies, *i.e.* when groups, large or small, of cells exist. These cell-walls it will be as well to call cell capsules.

#### OF THE CELL CAPSULES.

1. Where, as in rib-cartilage, large spaces are seen occupied by many cells, it will frequently be evident that between the cells and the matrix, a delicate and slightly granular membrane or capsule exists. A piece of such cartilage soaked in magenta is reddened in all its parts, but not equally, thus the matrix is deeply coloured and opaque; septa, equally coloured, are seen running inwards and dividing many of the larger groups; the cells are deeply coloured but translucent, whilst surrounding and apparently enclosing and separating them from the matrix, the capsules are faintly coloured. If caustic potash be now added, the colour vanishes from the matrix, the cells become more translucent and almost colourless, whilst the capsules still retain the colour.

2. Near the margin of ossification, the oval space in which the cell is contained is lined by a delicate membrane which may very properly be considered a capsule. Many of these have been obtained separate from the matrix, and are found to agree in shape and size with the vacuoles in the abandoned matrix. Very many I have distinctly seen double, that is having a median septum, each partition containing one cell, some have presented the appearance of more or less perfect division; others have evidently been torn and lost their cell or corpuscle, whilst again, close upon the bony margin, the capsule becomes much more evident, at the same time that the cartilage cell is smaller and the matrix more granular. These latter facts fully bear out Messrs.

Tomes and De Morgan's previous researches. Whatever doubt existed is now removed by the careful application of magenta.

MULTIPLICATION OF THE CELLS.

This *I believe* is accompanied by division of the capsule, the septa when fully formed being continuous with the surrounding matrix.

Microscopic preparations and diagrams showing all that has been now advanced, are around you for inspection.

ART. XXXVII.—*Remarks on the Australian Fish of the Genus Arripis.* By PROFESSOR M'COY, F.G.S., &c. &c.

Read 19th September, 1864.

Professor M'Coy described the generic characters of the genus *Arripis* so named, by Jenyns, from the supposed absence of the fan-like structure at the base of the scales which Professor M'Coy, however, showed to be generally present. Branchiostigals seven; all the teeth villiform; teeth on the palatine bones and vomer; tongue smooth; one dorsal with nine spines; anal with three; preoperculum denticulated. Pyloric appendages said, by the most recent writers, to be from seventeen to fifty, Professor M'Coy found to be one hundred and sixty.

The species were described as *Centropristes* by Cuvier, Richardson, &c., under the following names—

- Centropristes Georgianus.* (Cuv.)
- „ *Salar.* (Richardson.)
- „ *Tasmanicus.* (Homb.)
- „ *Truttaceus.* (Cuv.)
- Perca Trutta.* (Cuv.)

and probably *Perca marginata.* (Cuv.)

Of these, the *C. Georgianus*, Professor M'Coy found to be the adult form. It is the fish improperly called "salmon" by the colonists, the eating of which is supposed to be, at certain times and to certain people, more or less poisonous, although certainly good for food under other circumstances not yet understood. It has a nearly uniform pale olive colour.